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Assessment of Noise Levels of Elementary Schools in France and Turkey*

Fransa ve Türkiye'deki İlkokullarda Gürültü Düzeylerinin Değerlendirilmesi

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Abstract. In this study, noise levels of elementary schools in France and Turkey are evaluated according to data based on observation. As a qualitative research design, comparative case study design was applied. The scope of the study includes an elementary school from Turkey, in which the study named "Noise Pollution at School: Causes, Effects and Controlling It" was conducted, and an elementary school from France, in which the study named "Silence in the Hallways(Chut… dans les couloirs)" was conducted. Observation was used as a qualitative data collection tool. It is observed that the noise levels in class during class time is at medium level and during recess at high level in the elementary school in Turkey, whereas the noise levels both in class and hallways during class time and recess are at medium or low levels in the elementary school in France.

Keywords: Elementary school, Noise control, Noise level, Noise pollution

Öz. Bu çalışmada, Fransa ve Türkiye'de bulunan ilkokullarda gürültü düzeyi gözleme dayalı verilerle değerlendirilmiştir. Çalışma nitel araştırma desenlerinden karşılaştırmalı durum çalışması deseniyle gerçekleştirilmiştir. Örneklem seçiminde amaçlı örnekleme çeşitlerinden benzeşik örnekleme yöntemi kullanılmıştır. Bu doğrultuda çalışma kapsamına, Türkiye'den "Okulda Gürültü Kirliliği: Nedenleri Etkileri ve Kontrol Edilmesi" isimli çalışmanın yürütüldüğü bir ilkokul ile Fransa'dan "Koridorlarda sessizlik…"isimli çalışmanın yürütüldüğü bir ilkokul alınmıştır. Çalışmada nitel veri toplama araçlarından gözlem kullanılmıştır. Her iki ülkedeki okullar fiziksel açıdan karşılaştırıldığında, sınıf ve koridorlarda kullanılan malzeme ve donanımın akustik açıdan yetersiz olduğu görülmüştür. Türkiye'deki ilkokulda ders esnasında sınıflarda gürültüdüzeyinin orta, teneffüs sırasında ise yüksek düzeyde olduğu görülürken, Fransa'daki ilkokulda hem ders hem de teneffüs esnasında sınıf ve koridorlarda gürültü düzeyinin orta veya düşük düzeyde olduğu sonucuna ulaşılmıştır.

Anahtar Sözcükler: İlkokul, Gürültü kontrolü, Gürültü düzeyi, Gürültü kirliliği

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INTRODUCTION

The learning environment consists of the learner, the peer group, the teacher and the physical environment. Temperature, light, noise, class population are the main physical elements in the learning environment and influence the learning process either positively or negatively. Since external noise level covers the sounds and blocks auditory perception (Bilal, 2009), it is not tolerated around the school environment. By taking into consideration the fact that noise disturbs the students, inhibits their hearing, distracts them and damages their psychological health, teachers need to be well aware of internal and external noise in the class and make the necessary regulations (Arı & Saban, 2012). As a matter of fact, the school climate is closely connected with the attitudes of the students and teachers at school (Şentürk & Sağnak, 2012).

The realization of learning depends on the fact that the noise level values in class environments remain within reasonable limits (Bulunuz & Güner, 2017). The noise levels within the building that are considered to be reasonable are 38 dB in France, 30 dB in Germany, 36 dB in Italy, 35 dB in Portugal and 40 dB in UK (Avsar, Gonullu, Arslankaya & Kurt, 2001). The interior noise levels permitted in buildings in Turkey is 31 to 43 dB for classroom interiors and is 41 to 53 dB for the circulation areas such as corridors, stair hall and entrance halls (Bulunuz & Güner, 2017).

According to the newly published Regulation on Preventing Building Noise Pollution in Turkey, classrooms in educational institutions are considered most vulnerable to noise (Regulation on Preventing Building Noise Pollution, 2017). Yet noise studies based on sound measurements in Turkey show that schools have reached dangerous extents in terms of noise levels. For example in their research on elementary school students in İzmir, Özbıçakçı, Çapık, Gördes-Aydoğdu, Ersin and Kıssal (2012) found that the measured noise levels in all the hallways of the school are so high that they can impact the mental health of students negatively and lead to temporary hearing loss among students. It is unlikely to teach and learn efficiently in such an environment. Another study conducted in Kocaeli shows that the results of sound measurements of schools are much above the maximum acceptable noise level in their environments (Polat & Buluş-Kırıkkaya, 2004). The internal and environmental noise levels of 48 schools in various districts in Istanbul turned out to be very high as well (Tamer-Bayazıt, Küçükçifçi & Şan, 2011). Abakay and Bulunuz (2018) compared the school interior and exterior noise levels in primary, secondary and high schools in Bursa. In this study, the noise values of the school interiors were measured to be much higher than the reasonable values. Bulunuz, Bulunuz and Kelmendi-Tuncal (2017) reached the conclusion that noise level decreases in a school to which acoustic improvement is applied.

Furthermore, noise measurements carried out at university campuses show that noise pollution is very high. At Süleyman Demirel University, for instance, a study to create a noise map of the outdoor facilities within the campus revealed that some precautions should be taken at specific locations in order to control the noise level (Morova, Şener, Terzi, Beyhan & Harman, 2010). Kavraz (2015) found that Karadeniz Technical University is under high impact of traffic noise. Measurements made at another university identified the noise level to be between49.9-104.1 dB(A) (Kumbur, Özer & Avcı, 2006). It is obvious how huge the problem in learning environments is when a 79 dBA) noise occurring during in-class listening activities is compared to a simultaneous lawn mower with a 90 dB(A) noise (Tüzel, 2013). However, noise is not considered as a substantial environmental issue neither by teachers nor students (Artun, Uzunöz & Akbaş, 2013; Demirbaş & Pektaş, 2009; Sadık, Çakan & Artut, 2011).

Studies conducted abroad also reveal noise issues in schools. In urban areas with high population density in the world, the environmental noise that children are exposed to, adversely affects their school performance (Pujol, 2012). In a report on noise policies in Germany, Australia, France, Japan, Netherlands and Switzerland (OCDE, 1991), it was stated that there is a high and dangerous level of noise in these countries. Some studies regarding noise in France show resemblance to the results of the studies in Turkey. For example, a study conducted with 579 third graders in 31 public schools in a city with a population of 120,000 in France concluded that the environmental noise the students are exposed to influences their success in French and

Math negatively (Levain et al., 2015). Moch-Sibony (1981) elicited in another study in a noisy area comparing a school with appropriate sound insulation to a school without proper sound insulation that plane noises were negatively influencing the students in the school without insulation.

Preventing environmental problems can only be provided through an education that can change the perception of the people towards nature, and structure the values and attitudes of individuals regarding environment (Gökçe, Kaya, Aktay & Özden, 2007). Therefore, developing education and culture about noise is crucial. In his book "The Selfish Gene", Dawkins (1995) says that two things can copy themselves. The first one is genes, the second one is culture. In this context we need to create a quiet and calm school culture in Turkey. It is a widely known fact that some situations, events and values vary from society to society and that they are perceived differently. As an example, gestures and facial expressions may have different meanings in each society. Similarly, the level of preparedness of a child for school may alter in each society depending on various factors (Ülkü, 2007 quoting from Haktanır, 2002). Some behaviour may be interpreted as harmful in some cultures but harmless in others (Baydar, Küntay, Göşsen, Yağmurlu & Cemalcılar, 2010 quoting from McLoyd & Smith, 2002). Within this scope it is essential to provide education on noise awareness and consciousness at early ages (Bulunuz, 2014). Various projects and studies are being conducted in Turkey aiming at improving awareness and consciousness through education (Bulunuz, 2014; Bulunuz & Bulunuz, 2017; Bulunuz, Bulunuz, Orbak, Mutlu & Tavşanlı, 2017; Bulunuz, Bulunuz, Tavşanlı, Orbak & Mutlu, 2018; Özbıçakçı et al., 2012). One of these studies; the TÜBİTAK Project named "Noise Pollution at School: Causes, Effects, its Control" is still being carried out in Turkey. The project handles noise with an interdisciplinary approach with the cooperation and contribution of academicians from the educational, engineering and medical faculties (Bulunuz, Orbak & Bulunuz, 2015).

This study intends to evaluate noise levels of the elementary schools in France and Turkey with the observation data. The study will present the observation data collected from an elementary school which is one of the schools where the above mentioned research is being conducted, and one primary school from France, in which the study named "Chut… dans les couloirs (Silence in the hallways…)" was carried out. Detailed information regarding the presence of noise in the forenamed educational institutions and results on effectiveness of the conducted studies in these schools will be presented. The study seeks answers to the questions below:

1. At what degree are the indoor noise levels of elementary schools in France and Turkey?
2. What are the noise sources regarding the physical structure of the building and indoor student behaviour in elementary schools in France and Turkey?
3. How do elementary school teachers in France and Turkey react to noise?

METHOD

Research Design

Qualitative research methods were used in the study in order to comprehend and define the scope of noise pollution at schools (Büyüköztürk, Çakmak, Akgün, Karadeniz & Demirel, 2009). During a qualitative research, qualitative data collection methods such as observation, interview and document analysis are utilized and facts and events are revealed in their natural habitat in a realistic and holistic manner (Yıldırım & Şimşek, 2008). As a qualitative research design, comparative case study design was applied.

The Sample

The sample of the study consists of two elementary schools – one from France, one from Turkey – where studies to prevent noise pollution in schools were conducted. The schools were determined according to homogeneous sampling which is a type of purposive sampling method. Table 1 below shows specific information about the schools that were observed.

Table 1. *Information regarding the schools observed*

City/ Country	Average class population	Number of storeys at school	The project conducted at school
Bursa/ Turkey	34	3	Noise Pollution at School: Causes, Effects and Controlling it.
Rodez/ France	28	3	Chut… dans les couloirs (Silence in the hallways…)

Gathering Data

As to analyse the noise level and reasons on site, observation was employed which is an important data collection tool and frequently applied in qualitative research (Yıldırım & Şimşek, 2008). The observation form used in the project nr. TÜBİTAK 1001 114K738 named as "Noise Pollution at School: Causes, Effects and Controlling It" was adapted to this study and named as "Noise Observation Guide". The Noise Observation Guide includes chapters called "Noise level at indoor parts of the building", "Physical structure of the school", "Student behaviour", "Teacher attitude and behaviour" and "Further notes of the observer". Most observation guides comprise of sections listing detailed observation units. According to the purpose, ticks (✓) indicating the section has been seen, or tally indicating repetition, number indicating quantity or signs indicating the location on the graded scale are inserted next to these sections (Karasar, 2007). During the process of data gathering, the observed noise levels of classrooms, hallways, canteens and refectories are registered as low, medium or high on a graded scale in the "Noise level at indoor parts of the building" section of the Noise Observation Guide. In the other sections of the Noise Observation Guide a tick (✓) indicating that they have been seen were inserted next to the observed statements. For example, in the section regarding the physical structure of the school a choice has been made between the sentence pair "The ceiling is low ( ) – The ceiling is high ( )". As stated by Karasar (2007), special attention was given in order to form short, functional, few questions in the guide. The Noise Observation Guide included a total of eight question pairs. Intermittent observation was used in the schools with a frequency of once a week and for a duration of six weeks.

The Analysis of Data

The data obtained from the observations were analysed and interpreted in accordance with "descriptive analysis" approach. Descriptive analysis is a qualitative data analysis type summarizing and interpreting data, which is obtained through various data collecting techniques, according to predetermined themes. The researcher tries to exhibit his/her observations in a striking manner. The essential goal in descriptive analysis is to present a summarized and interpreted version of the gathered data. Descriptive analysis has four stages (Yıldırım & Şimşek, 2008). The following steps were taken in the descriptive analysis of the study: A framework was formed for data analysis and the way of organizing and presenting data was determined in the first stage in order to identify the themes under which the observed data was to be arranged and rendered. The data was read and organized according to the predetermined framework in the second stage. The data was arranged meaningfully and reasonably in this stage. Explanations were given concerning the organized data and tables and direct quotations were referred to where deemed necessary in the third stage. In the fourth stage, associations were made among findings and the findings were interpreted. The interpretations became more qualitative through comparisons. In order to support the data obtained from the Noise Observation Guide, photographs were taken and sound and video recordings were saved.

FINDINGS

The thematization of the study was made according to the questions. The themes identified in the study are presented below in table 2.

Table 2. *Themes*

1. Level of noise pollution in schools
2. Sources of noise in schools
3. The approaches of teachers towards noise

Table 2 lists the themes determined in the study as "Level of noise pollution in schools", "Sources of noise in schools" and "The approaches of teachers towards noise". The findings obtained from the Noise Observation Guide regarding the themes in question are presented below.

Findings on Noise Pollution Levels in Schools

The findings the researcher obtained from the chapter "Noise level at indoor parts of the building" of the Noise Observation Guide are shown below in table 3.

Table 3. *Observation results regarding the determination of indoor noise level*

Parts of school	Elementary school in France		Parts of school	Elementary school in Turkey	
	During recess	During class		During recess	During class
			Canteen	high	high
Hallway	medium	low	Hallway	high	high
Class	medium	medium	Class	medium	high
Refectory/canteen	medium	low	Refectory	high	high

(Low: Harmless sound level, Medium: Disturbing sound level, High: Psychologically and physically harmful, disturbing sound level that may disrupt sleep and rest)

The data about the observed noise levels during recess and class time in the elementary schools in France and Turkey show that the noise levels of the elementary school in France during recess were "medium" in the hallways, classes and refectories. The noise level in the classrooms of the elementary school in Turkey was just like in France at a "medium" level during recess. Yet, unlike in France, the noise levels in the canteen, hallways and refectory of the elementary school in Turkey during recess were experienced to be "high".

While there is "low" level of noise in the hallway and refectory (canteen) parts during class time in the elementary school in France, "high" level of noise is observed in the hallways, canteen and refectory during class time in the elementary school in Turkey. There is "medium" level of noise during class time in the classrooms of the elementary school in France, whereas the noise level in the same parts is detected to be fairly "high" in the elementary school in Turkey. Briefly, it is safe to say that the noise level inside the building during recess in the elementary school in France is "medium", and it is "high" inside the most parts of the building of the elementary school in Turkey. Similarly during class time, the noise level is observed to be "low" inside the most parts of the elementary school in France, and in the same time period it is observed to be "high" inside all parts of the elementary school in Turkey.

The observations in the elementary schools both during recess and class time have shown that there is more noise in the elementary school in Turkey than in the elementary school in France. Similar noise levels in the elementary schools in both countries have only been observed during recess in the classrooms. In the elementary school in France there can be mobility during recess due to exchanging classrooms called exercise transition leading to "medium" level of noise. However, most of the students in the elementary school in Turkey go to the canteen, hallways or out to the garden during recess, and few students remain inside the class. We can say that the noise level the few remaining students produce during recess in the elementary school in Turkey is similar to the noise level produced by the mobility of a great number of students trying to settle down inside the classroom during recess and exercise transition in the elementary school in France. We can deduce from this observation that there is more noisy behaviour among the students in the elementary school in Turkey.

The observations in the elementary school in France showed that during class time there was "medium" level of noise in the classrooms and, although there were students, there was "low" level of noise in the hallways and the refectory. It is striking that the elementary school students in France show no noisy behaviour especially in parts such as the hallways and refectory. The fact that there is "low" level of noise during class in the elementary school in France might be due to teachers in France allowing students to communicate with each other in a low voice during the lesson.

Findings on the Noise Sources in Schools

The findings obtained from the chapters "Physical structure of the school" and "Student behaviour" of the Noise Observation Guide are presented under this heading. When taking into consideration the physical structure of the elementary school in Turkey, the classroom ceilings are high, classrooms and hallways are paint on plaster, the hallways are commonly empty and bells are utilized at the end and beginnings of classes. The physical structure of the elementary school in France shows similarities to the elementary school in Turkey. The interior walls of the elementary school in France are mainly of gypsum material and insufficient for sound insulation. These findings expose that both elementary schools in the two countries have noise enhancing characteristics in terms of acoustical structure.

The observations intended to determine indoor student behaviour showed the tendency of the elementary students in Turkey to speak loudly and to run in the classrooms and hallways. The students in the elementary school in France, on the other hand, mostly walk when they are indoors, show calm and quiet behaviour in the hallways and speak in a normal voice.

Considering all the data regarding the physical structure of the building and indoor student behaviour, both buildings of the elementary schools in the two countries have noise enhancing character in terms of physical structure. The main distinction between the two countries is student behaviour. The elementary school students in France are more likely not to show noisy behaviour indoors. The fact that unlike the students in France, the elementary school students in Turkey show noisy behaviour indoors, is expressed by the researcher's observation note as follows:

> The students are screaming while running in the hallway. They especially run down the stairs and run out to the garden. The noise level in the canteen and refectory may cause tinnitus. Moreover the sound of the bell is far too high. It is not likely for the students and teachers to relax throughout the recess.

Another item in the study under the chapter "Physical structure of the school" of the Noise Observation Guide is the school bells. The observations in both countries revealed that bells are used for the beginnings and endings of the lessons and recesses. Unlike in France, the bell also rings for the teachers in Turkey 6 times a day. There is only one 15-minute-break before noon in the elementary school in France, yet the students get to the hallways every 55 minutes between the lessons or activities in order to get to the classrooms, ateliers or halls for the upcoming lessons or activities. Bells are used for these transitions as well. Table 4 presents the findings on the usage of bells within the scope of the research.

Table 4. *Findings on the Bells ın the Observed Schools*

	Elementary school in France	Elementary school in Turkey
Frequency of the bell ringing/ per day	10 times	18 times
Duration of the bell ringing/ per day	11 seconds	12 seconds
Type of bell	Without melody	Melodical
Sound level of the bell	Medium	First high then medium

The study has identified that the bell is ringing 10 times a day in the elementary school in France, and 18 times a day in the elementary school in Turkey. The sound recordings part of the observations show the duration of the bells ringing to be 11 seconds in the elementary school in France, and 12 seconds in the latter. The duration of the bells ringing is similar in both elementary schools in the two countries. Although the durations are similar, the bell types are

different. The sound recordings show that in the elementary school in France a regular bell without any melody is utilized where the bell in the elementary school in Turkey is melodical with a very much higher volume than the one in France.

The Approaches of Teachers towards Noise

Examining the data of the chapter "Teacher attitude and behaviour" from the Noise Observation Guide exposes that the teachers in the elementary school verbally advise the students to drop noisy behaviour where the teachers in the elementary school in Turkey mostly are unresponsive towards that type of behaviour. The teacher on duty (hall monitor) is held responsible for student behaviour outside the lesson in Turkey. Furthermore, it has been observed that the teachers in the elementary school in Turkey have become numb to noise and that they fail to react properly to noisy behaviour. The teachers in the elementary school in France, on the other hand, verbally warn the students that show noisy behaviour and demand eye contact from them. It may have contributed to the efficiency of the verbal warnings regarding noisy behaviour that the students are obligated to make eye contact during communication with teachers in France. It has been observed that eventually the students in France show less negative behaviour compared to the students in Turkey and that they accept and comprehend the warnings silently.

DISCUSSION

To sum up, through the observations it is determined that medium level of noise is experienced in most parts of the elementary school in France during recess, and high level of noise is experienced in most parts of the elementary school in Turkey during the same time period. In the elementary school in France there is mostly low level of noise during lessons but medium to high level of noise is observed in the elementary school in Turkey during lessons. The observations indicated that both schools in the two countries were built without considering sound insulation, with high ceilings and hard, flat surfaces and that bells are utilized. These findings are supported by the findings of Moch-Sibony (1981), in the research that exhibited the poor situation of the schools in France in terms of sound insulation and acoustics. Despite the fact that there is resemblance of the acoustical structure of the schools in the two countries, there has been significant difference detected between the noisy behaviours of the students. While silent and calm behaviour indoors was common among the students in France, noisy behaviour such as speaking loudly, running, playing, screaming was prevalent among the students in Turkey. This study concluded that the elementary school in France is far more peaceful and less noisy than the elementary school in Turkey. This result goes along with the studies that claim elementary schools in Turkey to be quite noisy (Tamer-Bayazıt et al., 2011; Özbıçakçı et al., 2012; Polat & Buluş-Kırıkkaya, 2004; Tüzel, 2013). These studies confirmed that sound levels in schools in Turkey are beyond acceptable limits. Furthermore, it is concluded through this study that while the bell rings eleven times in France per day, it is a total of eighteen times in the elementary school in Turkey. The duration of the ringing of the bell is 11 seconds in the elementary school in France, 12 seconds in the elementary school in Turkey. It is monitored that in the elementary school in France a regular bell without any melody is utilized where the bell in the elementary school in Turkey is melodical with a very much higher volume than the one in France.

Another matter the observations showed was that students with noisy behaviour were verbally warned by the teachers in the elementary school in France, but that the teachers in the elementary school in Turkey were mostly unresponsive to the noisy student behaviour. Bulunuz and Güner (2017), reached the conclusion that primary and secondary school teachers in Turkey get used to the noise occurring in break periods after a certain period and develop insensitiveness against accustomed noisy behavior.We may conclude that teachers in Turkey don't place importance on the noise issue. There happen to be other studies that come to the conclusion of teachers and students in Turkey not considering noise as a significant environmental problem (Artun et al., 2013; Demirbaş & Pektaş, 2009; Sadık et al., 2011).

The noise level of the elementary school in France turned out to have generally a lower level of noise than the elementary school in Turkey. Moreover, the researcher noted that the noise level experienced during class hours in the elementary school in France was as much as the noise level experienced after class hours, when there were only a few students, administrators and genitors left in the elementary school in Turkey. This indicates that the on-going project regarding noise has not yet been fully efficient. This result is inline with conclusions of numerous research conducted in Turkey (Bulunuz, 2014; Özbıçakçı et al., 2012). Another result of this study is that it demonstrates the necessity to perform further long term projects. Noise pollution has to be approached seriously and awareness and consciousness education has to be available at early ages.

The observation of high level of noise in the schools in Turkey confirms the requirement of arranging education and policies for the creation of a peaceful school culture. It is accepted that noise has negative effects in educational settings and it is necessary to enable the acquirement of awareness and proper behaviour as from early ages. There is a consensus that teachers can fairly contribute to the perception of noise as harmful within the society. This study has also proven that the Turkish and French societies evaluate the noise issue differently. Honking in the traffic, for instance, is not approved by the French society and can even be taken criminal action against. As for the Turkish society honking can be considered as a way of greeting. The French tend to speak quietly to each other while the Turkish greetings and jokes are rather noisy. Again in France, individuals place high importance on making eye contact while listening and speaking to each other. It is perceived to be disrespectful to avoid eye contact when communicating face to face. The cultural difference about noise of the Turkish and French societies is observed similarly in school settings as well.

According to the data obtained from the research, acoustical precautions need to be taken in order to control noise in schools. Sound insulation is a must to prevent external noise from entering indoors. The inside of the building also has to be equipped with acoustical ceiling, wall and floor material in order to control noise that is generated indoors.

Despite similar physical structures, the noise levels of the two schools were different due to the indoor behaviours of the students. From this viewpoint, it is essential that noise awareness education has to be prioritised in schools with high level of noise in Turkey. The relevant education programmes should start from pre-school period. As a substantial noise source in schools, it is recommended to shorten the duration of the bells and to decrease their sound levels. It would also be appropriate to cancel the extra bells ringing for the teachers.

The noise in schools is related to family life and social culture. Therefore, in order to control the noise in the school, the stakeholders and the close environment of the school should be informed. It can be recommended that this information may start with students and their families.The negative effects of noise on human health can be explained by experts to students, teachers and parents. At this point, cooperation at national level between the Ministry of Education and Ministry of Health in Turkey can be developed.

Acoustic classification can be made in all public institutions in line with the Regulation on Preventing Building Noise Pollution (2017). In accordance with these classifications, institutions can include acoustic regulations in their physical structures. At the same time, institutions can implement interior noise sources to prevent noise. Thus, it can contribute to the formation of a society that is sensitive to noise.

Studies and regulations on noise that only include schools might be insufficient. The noise in schools is closely related to family life and social culture. Therefore, eliminating noise, which is the problem of our era, is only possible through a holistic approach that involves not only the schools but also the families and society. The local authorities need to put environmental noise pollution on their agenda and conduct activities towards defeating it. Likewise, non-governmental organizations engaging themselves on noise pollution in schools would contribute to increase social awareness.

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